

**FABRIC TREATMENT DEVICE**

The present invention relates to a device, and to a kit and a process, for delivering a fabric treatment agent to a fabric, particularly, although not exclusively, for delivering a fabric treatment agent to a fabric in a washing machine.

Water-based laundering and non-water based laundering, commonly referred to as dry cleaning, processes are well known and are fundamentally different, but both may be used to clean fabrics and impart to the fabrics a fresh appearance and fragrance.

More recently, processes have been developed with a view to performing a substitute for a dry cleaning process using a conventional hot air clothes dryer. Suitably, these processes employ a container, e.g. a bag, within which the fabric and cleaning composition are placed. The bag opening is secured and the bag is placed inside the hot air clothes dryer. The heat and tumbling action associated with the drying cycle of the dryer causes the cleaning agent to contact the fabric, thereby cleaning the fabric and imparting the fabric with a fresh appearance and fragrance.

Sheets are used to deliver active ingredients to fabrics in water-based and non-water based laundering. For example, Woolite™ Dye Magnet™ sheets are added in water-based laundering to trap dyes which bleed off the fabric thus preventing transfer.

Sheets are also used in tumble dryers to deliver fabric treatment agents, such as, fabric softening and/or anti-static agents, to the fabric during the drying cycle of the tumble dryer, such products are marketed under the  
5 name Bounce™ or Cling Free™.

The present invention seeks to improve known forms of delivery of fabric treatment agents on flexible support substrates by the use of releasable attached rigid  
10 supports to maintain the form of the flexible substrate during the tumbling action of a fabric treatment machine. By maintaining the shape of the sheet it does not become entangled in the fabric items being treated and is, therefore, better able to uniformly deliver the fabric  
15 treatment agent. By ensuring that the sheet is releasably attached the rigid support may be reused several times. In addition the rigid support may be used for sheets of varying sizes.

20 EP0040931 describes a fabric treatment item which is a bag containing a fabric treatment agent. The bag is sealed on one side with a "weak seal" which is designed to break and release the agent during the mechanical action of a washing machine. The bag is strengthened on one side by  
25 rigid supports which are attached to the bag.

US4255484 describes a fabric conditioning item for use in a tumble dryer which is fibrous sheet material coated with a stiffening polymer on one side.

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According to a first aspect, the present invention provides a process for delivering a fabric treatment agent to a fabric comprising:

- (a) releasably attaching a rigid support to a flexible substrate onto which is releasably fixed a fabric treatment agent;
- 5 (b) placing the rigid support/flexible substrate and a fabric inside a fabric treatment machine; and
- (c) operating the fabric treatment machine.

Such a process is referred to hereinafter as the process  
10 of the present invention.

A further feature of the invention is a device comprising a flexible substrate containing a releasably fixed fabric treatment agent and releasably attached to the flexible  
15 substrate a rigid support.

It will be appreciated that the term fabric treatment machine includes any standard domestic and/or industrial washing or drying machine (e.g. front or top loader).  
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Suitably, the rigid support may be such as to prevent the flexible substrate from entangling with the fabric. Suitably, the rigid support may maintain the flexible substrate in an uncrumpled form during the process of the  
25 present invention. In particular, the rigid support may maintain the flexible substrate in a substantially flat orientation, whilst permitting the flexible substrate to flex between moderately concave forms. This may not only permit increased delivery of the fabric treatment agent  
30 from the substrate but also it may promote uniform delivery of the fabric treatment agent to the fabric (in typically, throughout the laundry load of multiple fabric

articles), thereby resulting in an increased even dispersal of the fabric treatment agent to the fabric.

By the term "fabric" or "fabric articles" or "laundry  
5 load" as used herein we include not only clothing, but other items which are laundered such as sheets, draperies, rugs, upholstery coverings and towels. Preferably, the fabric employed in the process of the present invention is a wet or a dry fabric.

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A particularly preferred temperature range of the fabric treatment machine is greater than or equal to 40°C to less than or equal to 90°C.

15 Suitably, in the process of the present invention, the machine is operated for less than or equal to 1 hour 30 minutes, preferably less than or equal to 1 hour 15 minutes, preferably less than or equal to 1 hour, most preferably less than or equal to 45 minutes.

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Suitably, in the process of the present invention, the machine, containing the container, is operated for greater than or equal to 15 minutes, more preferably greater than or equal to 20 minutes, most preferably greater than or  
25 equal to 30 minutes.

Suitably, the rigid support may be releasably attached to the flexible substrate by any suitable attachment means for example by use of mechanical fastening, for example,  
30 clips, Velcro™ strips, and/or piercing means which pierce and attach the flexible substrate to the rigid support. Suitably, the attachment means may be an integral structure of the rigid support and/or a structure separate

from the support. Preferably, the attachment means are an integral structure of the support.

Conveniently, the support and flexible substrate of the  
5 device may be manufactured and sold separately.

Preferably, the rigid support comprises a two-piece construction. Suitably, the two-piece construction may comprise two separate support members engageable with each  
10 other. Alternatively, the rigid support comprises a one-piece construction. Suitably the one-piece construction may comprise two interconnected support members relatively moveable, to hold or release the flexible substrate. More preferably, the support comprises a two-piece construction  
15 and a part of the flexible substrate is releasably held by the support. For example, the two pieces of the support may be attached to each other by one or more hinges. The one or more hinges may be a separate structure from the support and/or they may comprise a living hinge formed  
20 between the two pieces of the support. Alternatively, or additionally, the two pieces of the support may be joined together by snap fit engagement of the two pieces.

According to a preferred embodiment of the present  
25 invention, the support as defined herein comprises a frame. Most preferably, the frame is an endless frame. More preferably, a part of the flexible substrate is attached, preferably releasably attached, to the frame. Suitably, securing the flexible substrate in a frame may  
30 increase and maintain the effective surface area of the flexible substrate for contacting laundry during use, compared to a substrate not secured in a frame. Suitably, increased amounts of fabric treatment agent may be

dispersed from and more uniformly throughout the laundry from the device compared to a flexible substrate not secured in a frame.

- 5 Typically, the support of the device of the present invention is thermally stable so that it may be suitable for use in a washing machine which may operate at temperatures of 20°C to 200°C, preferably 40°C to 110°C. Suitably, the support may be wholly or partially rigid.
- 10 Preferably, the support is totally rigid. Typically, the support is formed from a plastic material such as soft touch materials, such as, thermoplastic elastomer materials and silicone rubber, or conventional thermoplastic materials, such as, polyethylene,
- 15 polypropylene or polyvinylchloride by techniques well known to those skilled in the art such as thermoforming, blow-moulding and injection moulding. As an alternative metal can be used in the production of the rigid support. In the alternative where the rigid support attaches to the
- 20 flexible substrate then it may take simple forms such as a cross or a frame. In the alternative where the flexible substrate is held within the rigid support then an opening is provided for the insertion of the flexible substrate and also for exit of the active materials on the flexible
- 25 sheet from the flexible substrate, this may be the opening or from an additional opening, and optionally a closure is provided to the opening for insertion of the flexible substrate.
- 30 Preferably the outer dimensions of the rigid support are smaller than at least the width or length or depth of the flexible substrate, preferably both the width and the length of the flexible substrate.

Preferably the rigid support is attached to more than one side of the flexible substrate, ideally one, two or three sides (preferably to just one or two sides).

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Preferably, the flexible substrate comprises a fibrous material. Suitably, the fibrous material may comprise woven and/or non-woven fibres that are adhesively or thermally bonded together by techniques well known to those skilled in the art. Preferably, the fibrous material is a non-woven fibrous material. The fibrous material may be a natural fibre, such as wool, silk, jute, hemp, cotton. Alternatively, or additionally, the fibrous material may be a synthetic fibre, such as rayon, a polyester, a polyamide, a polyvinyl derivative, a polyacrylate or a polyolefin.

Suitably, any diameter or denier of fibre is useful in the flexible substrate of the device of the present invention. In the case of staple fibres, fibre lengths may vary from about 0.5 cm to 5 cm. In the case of spun bonded webs, the fibre lengths may be indefinite.

Suitably, when the flexible substrate comprises a fibrous material as defined herein the total basis weight of the substrate including the fabric treatment agent releasably attached thereto is greater than or equal to 25 g/m<sup>2</sup>, more preferably greater than or equal to 30 g/m<sup>2</sup>, most preferably greater than or equal to 35 g/m<sup>2</sup>.

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Suitably, when the flexible substrate comprises a fibrous material as defined herein, the total basis weight of the substrate including the fabric treatment agent releasably

attached thereto is less than or equal to  $65 \text{ g/m}^2$ , more preferably less than or equal to  $60 \text{ g/m}^2$ , most preferably less than or equal to  $55 \text{ g/m}^2$ .

- 5 Most preferably, the flexible substrate is a flexible sheet or cloth, particularly a flexible sheet comprising a fibrous material as defined above. Suitably, the flexible sheet is greater than or equal to 0.5 mm thick. Suitably, the flexible sheet is less than or equal to 5 mm thick.
- 10 Suitably, the flexible sheet has an area of 10 to  $150 \text{ cm}^2$ .

Suitably, the flexible substrate as defined herein comprises a porous structure. Typically, the flexible substrate includes a void volume of greater than or equal to 40%, more preferably greater than or equal to 50%, preferably greater than or equal to 60%, preferably greater than or equal to 70%, most preferably greater than or equal to 80% of the total volume of the flexible substrate.

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Suitably, the property of permeability of the flexible substrate may permit a fabric conditioning agent to be selectively or uniformly deposited throughout the flexible substrate.

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Suitably, the flexible substrate as defined herein is thermally stable so that it may be suitable for use in a washing machine, which may operate at temperatures of less than or equal to  $100^\circ\text{C}$ , more preferably less than or equal to  $95^\circ\text{C}$ . Preferably, the flexible substrate is thermally stable at temperatures of  $20^\circ\text{C}$  to  $100^\circ\text{C}$ .

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Preferably, the fabric treatment agent comprises a fabric cleaning agent. Preferred fabric treatment agents are well known to those skilled in the art and include: fabric conditioner (such as fabric softening, lubricant, or  
5 nutrient), surfactant and fragrance.

Preferably, the fabric treatment agent comprises a fabric softening agent. Suitable fabric softening agents are well known to those skilled in the art and include: cationic  
10 quaternary ammonium salts such as quaternary imidazolinium salts; non-ionic compounds such as tertiary phosphine oxides; anionic soaps, sulfates and sulfonates e.g. fatty acid soaps and ethoxylated alcohol sulfates; and amphoteric tertiary ammonium compounds; and compatible  
15 mixtures of one or more of these softening agents.

Alternatively, or additionally, the fabric treatment agent may comprise an anti-static agent, an anti-creasing agent, an antimicrobial agent, a fragrance, and/or an odour  
20 masking or absorbing agent.

Suitably, the flexible substrate comprises greater than or equal to 2.5 wt%, more preferably greater than or equal to 5 wt%, but preferably less than or equal to 10 wt% of the  
25 fabric treatment agent as defined herein.

Suitably, the flexible substrate comprises less than or equal to 25 wt%, more preferably less than or equal to 20 wt% of the fabric treatment agent as defined herein.

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Suitably, the fabric treatment agent(s) is releasably fixed to the flexible substrate by techniques well known to those skilled in the art. For example, the fabric

treatment agent(s) may be dispersed/dissolved in a solvent system comprising an organic solvent and/or an aqueous solvent, optionally with the application of heat e.g. 70°C to 85°C, and the resultant dispersion/solution deposited  
5 onto the flexible substrate as defined herein by dipping, spraying or brushing. Suitably, the organic solvent and/or aqueous solvent is permitted to evaporate from the flexible substrate to provide the substrate impregnated with a dried fabric treatment agent(s).

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Preferably, the fabric treatment agent as defined herein is releasable from the substrate by heating the substrate. Suitably, the fabric treatment agent softens within the operating temperature range of a fabric treatment machine,  
15 such as between 20°C to 140°C, preferably 40°C to 100°C, so that it is released from the flexible substrate during the process of the present invention.

Suitably, the fabric treatment agent is released from the  
20 flexible substrate at a temperature of less than or equal to 75°C, more preferably less than or equal to 90°C, most preferably less than or equal to 100°C.

Alternatively, or additionally, the fabric treatment agent  
25 is released from the flexible substrate upon agitation of the flexible substrate, particularly upon rubbing contact with a fabric.

According to a second aspect of the present invention,  
30 there is provided a device as defined hereinbefore for delivering a fabric treatment agent to a fabric, comprising a fabric treatment agent as defined hereinbefore releasably fixed to a flexible substrate as

defined hereinbefore, wherein the flexible substrate is attached to or contained within a rigid support as defined hereinbefore.

- 5 Such a device is referred to as the device of the present invention.

According to a third aspect, the present invention provides a method for manufacturing the device of the  
10 present invention.

According to a fourth aspect, the present invention provides a kit comprising a device of the present invention. Preferably, the kit includes a plurality of  
15 flexible substrates. Preferably the kit contains a smaller plurality of supports than of flexible substrates or, preferably, a single support.

According to a fifth aspect, the present invention  
20 provides the use of a flexible substrate as defined hereinbefore attached to or contained within a rigid support as defined hereinbefore for delivering a fabric treatment agent as defined hereinbefore to a fabric, wherein the fabric treatment agent is releasably fixed to  
25 the flexible substrate. Preferably, the flexible substrate/rigid support is placed inside a tumble dryer or a washing machine.

It will be appreciated that any of the features set forth  
30 in the first aspect of the present invention, may be regarded as preferred features of the second, third, fourth and fifth aspects of the present invention.

The present invention will now be illustrated by way of the following non-limiting examples, in which:-

Figure 1 is a perspective view of the device of the  
5 present invention.

Figure 2 is a perspective view of the component parts of the device of Figure 1.

10 Figure 1 shows a non-woven cellulose derived cloth having surfactant, solvent and fragrance impregnated (2) held in a rigid oval-shaped plastic frame (4). As is more clearly shown in Figure 2, the frame (4) comprises an upper part (6) and a lower part (8). The upper part (6) includes one  
15 or more protrusions (not shown) extending from a surface thereof. The lower part (8) includes one or more recesses (not shown) in a surface thereof. The recesses of the lower part (8) are dimensioned to receive the protrusions of the upper part (6), so that the upper part (6) snap  
20 fits into the lower part (8), thereby holding the cloth (2) therebetween.

Figure 2 shows a rigid plastic container into which a non-woven cellulose sheet as described in Figure 1 can be  
25 inserted.

In use, dry clothing or other fabrics to be treated are loaded into tumble dryer with the device of the present invention.